

# इंटरनेट

# मानक

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Jawaharlal Nehru

“Step Out From the Old to the New”

IS 8872-4-3 (1982): Variable Resistors, Part 4: Presets, Section 3: Type VRT 3 [LITD 5: Semiconductor and Other Electronic Components and Devices]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



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Indian Standard

## SPECIFICATION FOR VARIABLE RESISTORS

## PART IV PRESETS

## Section 3 Type VRT 3

**0. General** — This standard shall be read in conjunction with IS : 8872 ( Part I )-1977 ' Specification for variable resistors: Part I General requirements and methods of tests '.

**1. Scope** — This standard covers the requirements of carbon single turn presets.

**2. Outline Drawing and Dimensions** — The outline drawing and dimensions shall be according to Fig. 1 and 2.

**3. Ratings** — Ratings shall be as specified in Table 1.

**Note** — For ratings at temperature other than 40°C, reference shall be made to derating curve shown in 4.

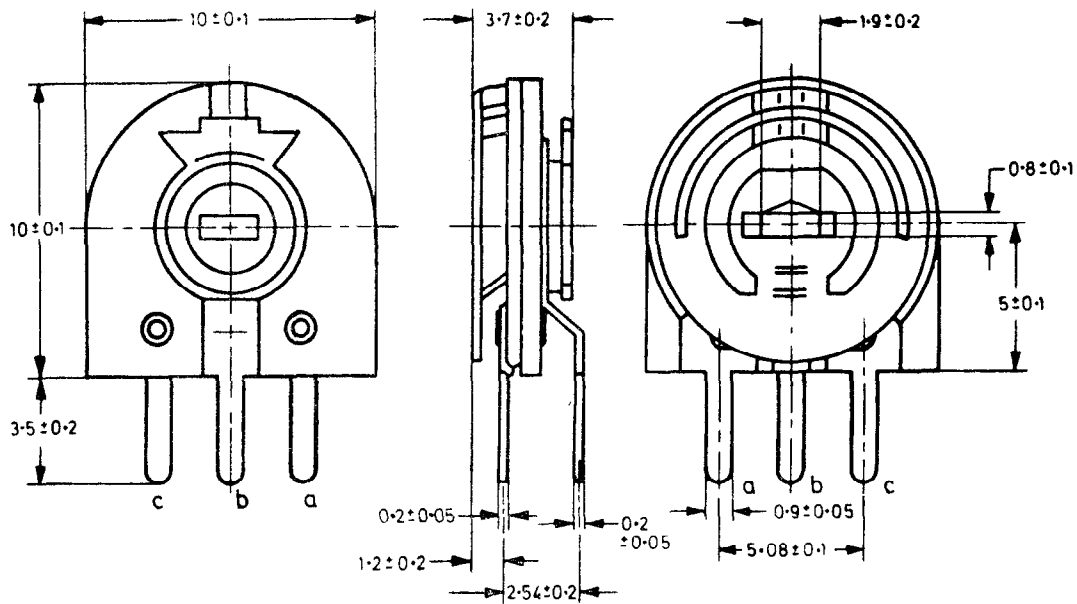
**4. Characteristics**

a) Selection tolerance	$\pm 30$ percent, $\pm 20$ percent
b) Stability class	$\pm 20$ percent
c) Temperature coefficient	$\pm 1\,200$ ppm/°C
d) Vibration	10 to 55 Hz, 0.77 mm, $3 \times 2$ h
e) Bump	1 000, 100m/s <sup>2</sup>
f) Climatic category	10/70/21
g) Maximum surface temperature	85°C
h) Angle of rotation	Electrical = $200 \pm 10^\circ$ Mechanical = $260 \pm 10^\circ$
j) Rotational life	50 operations
k) Resistance range	47Ω to 5MΩ for 10 mm presets 100Ω to 5MΩ for 18 mm presets
m) Rated limiting voltage	150V for 10 mm presets 500V for 18 mm presets
n) Resistance value	The preferred values in this range shall be: 47Ω, 100Ω, 220Ω, 470Ω, 1kΩ, 2.2kΩ, 4.7kΩ, 10kΩ, 22kΩ, 47kΩ, 100kΩ, 220kΩ, 470kΩ, 1MΩ, 2.2MΩ and 4.7MΩ.

Adopted 23 June 1982

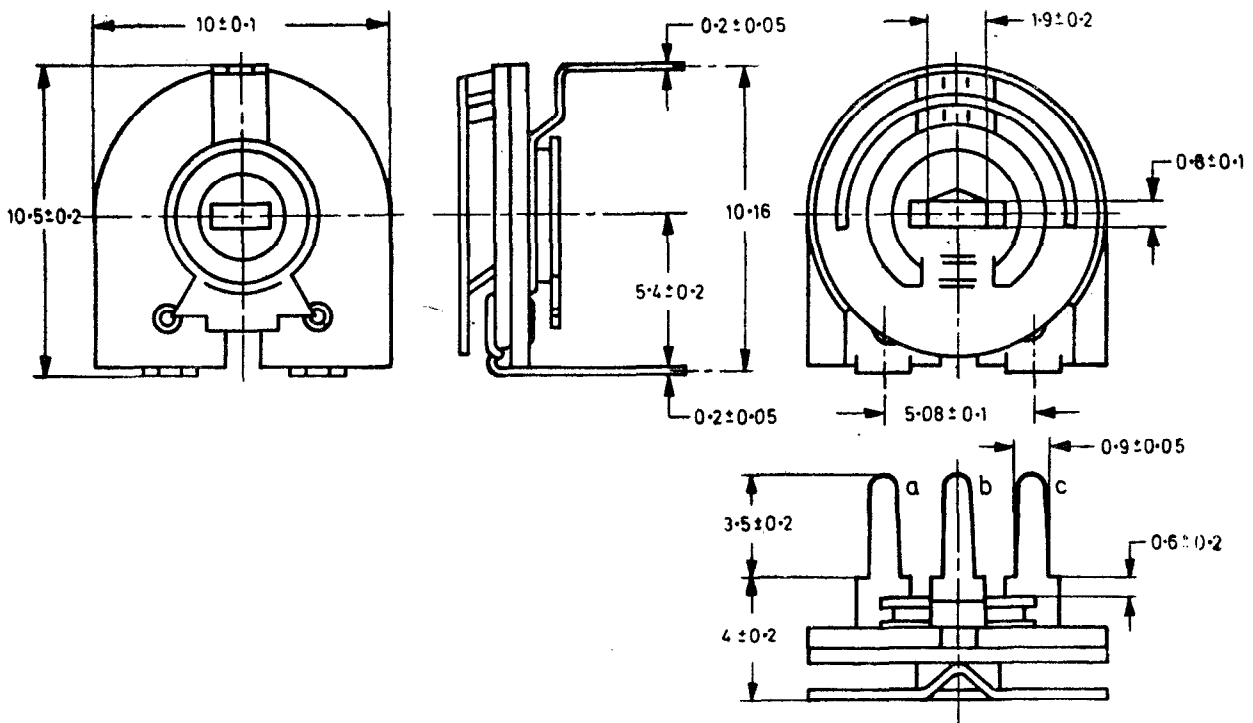
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Gr 4



All dimensions in millimetres.

1A 10 mm Preset for Vertical Mounting

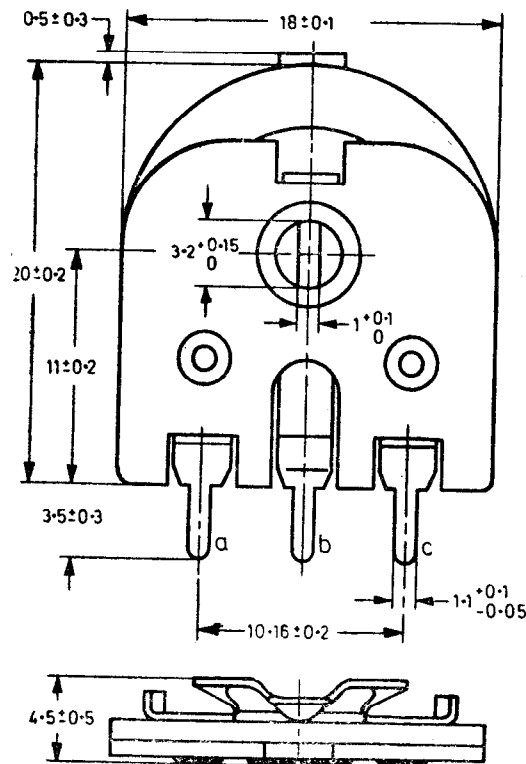


All dimensions in millimetres.

1B 10 mm Preset for Horizontal Mounting

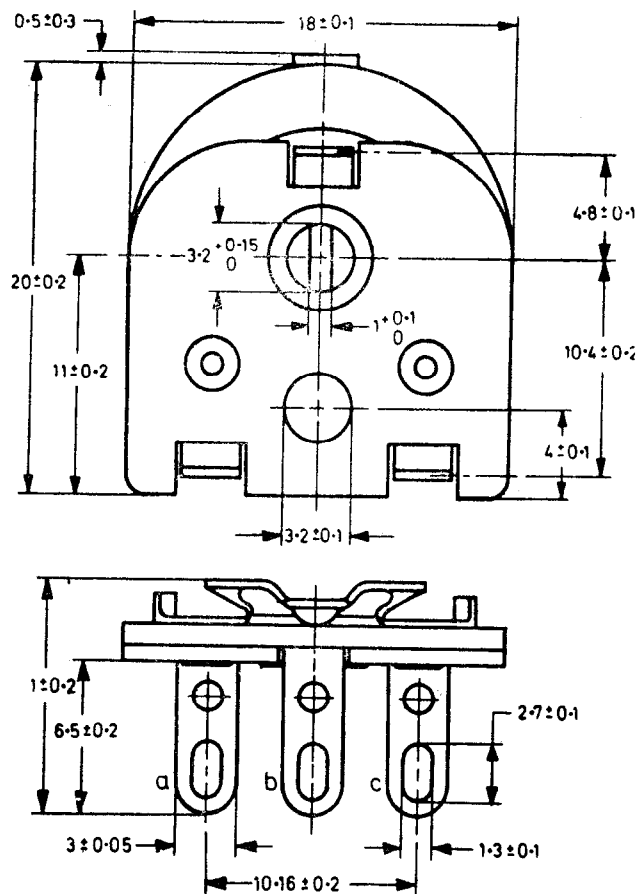
Typical Instruction: Carbon Film Composition, Variable preset type and with rotary motion.

FIG. 1 OUTLINE DRAWING AND DIMENSIONS FOR STYLE VRT3-0.1



All dimensions in millimetres.

2A 18 mm Preset for Vertical Mounting



All dimensions in millimetres.

2B 18 mm Preset for Horizontal Mounting

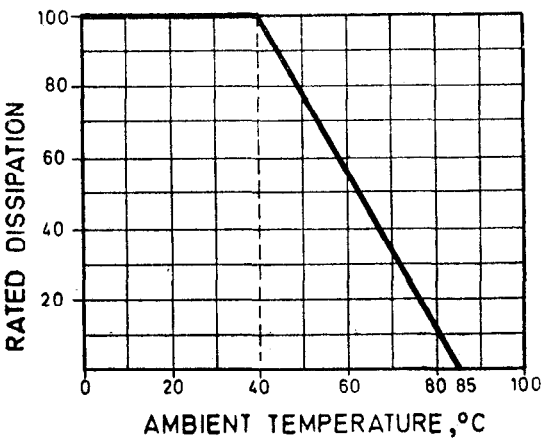
Typical Construction : Carban film/composition, variable, preset type with rotary motion

FIG. 2 OUTLINE DRAWING AND DIMENSIONS FOR STYLE VRT3-0.25

TABLE 1 RATINGS  
( Clause 2 )

Sl No.	Style	Type	Figure Reference	Rated Dis-sipation at 40°C ( W )	Resistance Law	Operating Torque ( mMM )	End stop Torque ( mNM ) Max
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	VRT3-0.1	10 mm vertical mounting	1A	0.1	Linear	3.5-25	50
		10 mm horizontal mounting	1B	0.1	Linear	3.5-25	50
ii)	VRT3-0.25	18 mm vertical mounting	2A	0.25	Linear	5.50	100
		18 mm horizontal mounting	2B	0.25	Linear	5-50	100

5. Derating Curve



6. Marking — See 6 of IS : 8872 ( Part I )-1977.

7. Material Construction and Workmanship — See 5 of IS : 8872 ( Part I )-1977.

8. Tests

8.1 Classification of Tests

8.1.1 Type tests — The sequence of type tests and the requirements shall be in accordance with Table 3.

8.1.1.1 The manufacturer shall submit for each rated dissipation, the number of samples as given below:

- a) 16 samples of the highest value;
- b) 16 samples of the middle value; and
- c) 16 samples of the lowest value.

**Note** — If approval is desired for different mounting styles, six additional samples in each lowest, middle and highest value shall be submitted. These samples shall be subjected to Group 0 tests only.

8.1.2 Routine tests — The following tests shall be carried out on each and every resistor:

- a) Visual examination,
- b) Electrical continuity, and
- c) Total resistance.

**8.1.2.1** If during routine tests more than 10 percent samples of the lot fails the entire lot may be rejected.

**8.1.3 Acceptance tests**— The resistors which have passed the routine tests shall be subjected to these tests. The acceptance tests and the failure criteria shall be as given in Table 2.

**8.2 General Conditions for Tests**— See 8 of IS : 8872 (Part I)-1977. The same measuring set shall be used for any one test but not necessarily for all tests.

TABLE 2 SCHEDULE OF ACCEPTANCE TESTS

SI No.	Test	Clause Ref in IS : 8872 ( Part I )-1977	AQL ( Percent Defective )	Inspection* Level	D/ND
(1)	(2)	(3)	(4)	(5)	(6)
I) <i>Group A</i>			1 percent	II	ND
	a) Dimensions	9.1.1			
	b) Resistance law	8.7			
	c) Voltage proof ( flash test )	8.9			
	d) Operating torque	9.2			
II) <i>Group B</i>					
	<i>Sub-group B1</i>		4 percent	S <sub>3</sub>	ND
	a) Solderability	9.8.3			
	<i>Sub-group B2</i>		4 percent	S <sub>3</sub>	D
	a) Resistance to soldering heat	9.8.4			
	b) Robustness of terminations	9.7			
	c) Endurance ( mechanical )	11.3			
	d) End stop torque	9.4			
	<i>Sub-group B3</i>		4 percent	S <sub>3</sub>	D
	a) Bump	9.10			
	b) Climatic sequence	10.1			
	<i>Sub-group B4</i>		4 percent	S <sub>3</sub>	ND
	a) Endurance ( electrical ) ( 168 hours )	11.4			

D = Destructive

ND = Non-destructive

**Note**— For each group/sub-group, separate samples shall be drawn.

\*See Indian Standard Sampling plans and procedures for inspection by attributes for electronic items ( under preparation ).

TABLE 3 TEST SCHEDULE AND REQUIREMENTS

( Clause 8.1.1 )

SI No.	Test	Clause Ref in IS : 8872 ( Part I )-1977	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
I) <i>All Samples ( Group 0 )</i>				
	a) Visual examination	9.1	—	Condition, workmanship and finish shall be satisfactory. Marking shall be legible and indelible
	b) Dimensions	9.1.1	—	Dimensions shall be as per Fig. 1 and 2
	c) Element resistance	8.2	—	Resistance value shall be within the selection tolerance as specified
	d) Terminal resistance	8.3	—	The minimum terminal resistance at either end of the resistor shall not exceed the value given in Appendix A

( Continued )



TABLE 3 TEST SCHEDULE AND REQUIREMENTS — *Contd*

SI No.	Test	Clause Ref in IS : 8872 ( Part I )-1977	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
	e) Resistance law	8.7	At 50 percent of the mechanical rotation	The output ratio $V_{ab}/V_{ac}$ shall be within the limits given below when the moving contact is set at 50 percent of total angle of electrical rotation: 1) When the rated resistance is less than $0.22 \text{ M}\Omega$ , the resistance ratio $V_{ab}/V_{ac}$ shall be between 40 to 60 percent 2) When the rated resistance is greater than or equal to $0.22 \text{ M}\Omega$ , the resistance ratio $V_{ab}/V_{ac}$ shall be between 35 to 65 percent
	f) Operating torque	9.2	—	The value shall be as given in Table 1
	g) End stop torque	9.4	—	There shall be no deformation or mechanical damage, and the value shall be as given in Table 1
ii)	<i>First Group</i>			
	a) Solderability	9.8.3	—	—
	b) Robustness of terminations	9.7	Tensile: 5N, Bending: 1 Bend to be sent through $90^\circ$	—
	c) Bump	9.10	1 000 Bumps, $100 \text{ m/s}^2$	—
	1) Visual examination	9.1	—	There shall be no fracture, loosening of parts or other mechanical damage
	2) Element resistance	8.2	—	The change in the resistance from the initial value shall not exceed $\pm 5$ percent
	d) Vibration	9.9	10 to 55 Hz, $0.77 \text{ mm}$ $3 \times 2 \text{ h}$	—
	1) Visual examination	9.1	—	There shall be no fracture, loosening of parts or other mechanical damage
	2) Element resistance	8.2	—	The change in resistance from the initial value shall not exceed $\pm 2$ percent
	e) Climatic sequence	10.1	—	—
	1) Dry heat	10.1.2	At $+70^\circ\text{C}$	—
	2) Damp heat (accelerated) first cycle	10.1.3	One cycle	—
	3) Cold	10.1.4	At $-10^\circ\text{C}$	—
	i) Operating torque	9.2	—	The value shall not exceed 1.5 times the maximum value specified in Table 1
	4) Damp heat (accelerated) remaining cycles	10.1.6	—	—
	i) Working test	—	Within 15 minutes after removal from the chamber and before the recovery period, rated voltage shall be applied for 1 minute between, all terminations connected together as one pole, and spindle and case connected together as another pole	There shall be no breakdown or flash-over
	ii) Visual examination	9.1	—	There shall be no corrosion, fracture, loosening of parts or other mechanical damage shall occur. Marking shall be legible and indelible
	iii) Element resistance	8.2	—	The change in resistance from the initial value shall not exceed $\pm 20$ percent

( Continued )

TABLE 3 TEST SCHEDULE AND REQUIREMENTS — *Contd*

Sl No.	Test	Clause Ref in IS : 8872 ( Part I )-1977	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
iii)	<i>Second Group</i>			
	a) Damp heat ( long term )	10.2	—	—
	1) Visual examination	9.1	—	There shall be no corrosion, fracture, loosening of parts or other mechanical damage . The marking shall be legible and indelible
	2) Element resistance	8.2	—	The change in resistance from the initial value shall not exceed $\pm 20$ percent
iv)	<i>Third Group</i>			
	a) Endurance ( mechanical )	11.3	At 50 cycles, 4 cycles per minute, no load	—
	1) Visual examination	9.1	—	There shall be no fracture, loosening of parts or other mechanical damage
	2) Element resistance	8.2	—	The change in resistance from the initial value shall not exceed $\pm 20$ percent
v)	<i>Fourth Group</i>			
	a) Endurance ( electrical )	11.4	At + 40°C	—
	1) Visual examination	9.1	—	There shall be no fracture, or any other mechanical damage. Marking shall be legible and indelible
	2) Element resistance	8.2	—	The change in resistance from the initial value shall not exceed $\pm 10$ percent
vi)	<i>Fifth Group</i>			
	a) Resistance to soldering heat	9.8.4	—	—
	1) Visual examination	9.1	—	There shall be no fracture, loosening of parts or other mechanical deterioration
	2) Element resistance	8.2	—	The change in resistance from the initial value shall not exceed $\pm 5$ percent
vii)	<i>Sixth Group</i>			
	a) Temperature characteristic of resistance	8.11	—	The value shall be $\pm 1200$ ppm/°C

## APPENDIX A

[ Table 3, Sl No. i (d) ]

## MINIMUM RESISTANCE

Rated Resistance		Clockwise and Counter Clockwise Maximum Value of Minimum Resistance ohms
Greater Than ohms (1)	Less than or Equal to ohms (2)	
—	500	10
500	1 k	25
1 k	5 k	100
5 k	10 k	200
10 k	25 k	400
25 k	50 k	1 k
50 k	0.1 M	2 k
0.1 M	0.25 M	4 k
0.25 M	0.50 M	10 k
0.5 M	1 M	20 k
1 M	2.5 M	40 k
2.5 M	5 M	100 k